

United States
Department of the Interior
Geological Survey

MULTICHANNEL SEISMIC-REFLECTION DATA COLLECTED
IN 1982 IN THE TONGA REGION OF THE SOUTH PACIFIC OCEAN

by

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U.S. Geological Survey
Open File Report
86-457

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U.S. Geological Survey, Menlo Park, CA

1986

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In early April, 1982 the U.S. Geological Survey (USGS) collected approximately 2,325 km of 24-channel seismic-reflection data across the Lau Basin, Tonga Ridge and Tonga Trench in the Tonga region of the South Pacific. The profiles were collected on the USGS Research Vessel S.P. Lee, (USGS survey identifier L5-82-SP) as part of the Australia-New Zealand-United States Tripartite Agreement of 1982 in co-operation with the Ministry of Lands, Survey and Natural Resources of the Kingdom of Tonga. Interpretations of these data are shown in several papers in Scholl and Vallier (1985).

Seismic energy was provided by a tuned array of five airguns with a total volume of 1313 cubic inches of air compressed to approximately 1900 psi. The recording system consisted of a 24-channel, 2400 meter long streamer with a group interval of 100 m, and a GUS (Global Universal Science) model 4200 digital recording instrument. A shooting geometry of 50-m shotpoint intervals with 100-m group intervals resulted in 24-fold data collection. Navigational control for the survey was provided by a Magnavox integrated navigation system using transit satellites and doppler-sonar. A 2-millisecond sampling rate was used in the field; the data were later desampled to 4-milliseconds during the demultiplexing process. An 8 second data length was recorded, which combined with a deep water delay, yielded up to 16 seconds of two way travel time. Processing was done at the USGS Pacific Marine Geology Multichannel Processing Center in Menlo Park, California, in the sequence: editing-demultiplexing, velocity

analysis, CDP stacking, deconvolution-filtering, and plotting on an electrostatic plotter. Plate 1 is a trackline chart showing shotpoint navigation.

Recording problems caused unreadable records at various times throughout the survey. The field data is recorded digitally on AMPEX-DMA high speed tape transports in HDDR (high density digital recording) format. HDDR tapes are recorded on 14 tracks; each track is written sequentially over the full length of the tape with the odd-numbered tracks in the forward direction, and the even ones in the reverse. Certain tapes were found to have entire tracks unreadable owing to tape drive problems during data collection, resulting in gaps of 30 to 50 shots, corresponding to data lost on a single bad track, or larger gaps that represent several bad tracks or entire tapes. Attempts to recover these lost data have thus far not been successful.

The data are available in the following formats:

- 1) Electrostatically plotted profiles which have been deconvolved and filtered after stacking. Copies of the profiles may be purchased through:

National Geophysical Data Center
NOAA/EDIS/Code D64
325 Broadway
Boulder, Colorado 80302

- 2) Digital magnetic stack tapes which have been processed using velocities derived from velocity analysis. These tapes are not deconvolved or band-pass filtered. Stack tapes are in Phoenix format; a Seismograph Service Corp., 16-bit integer trace sequential format. Copies of the stack tapes and a description of the tape format can be obtained at the requesters expense by contacting:

Dennis M. Mann
Pacific Branch of Marine Geology
U.S. Geological Survey
345 Middlefield Rd. MS 979
Menlo Park, California 94025

- 3) Digital magnetic demultiplexed tapes. These tapes have been edited for missed shots, blanking times, and muting times. Demultiplexed tapes are in PhoenixI format; a Seismograph Service Corp. modified S.E.G.-X 32-bit floating point format. Copies of the demultiplexed tapes and a description of the tape formats can be obtained at the requesters expense by contacting Dennis Mann at the above address.

- 4) A presentation of all geological and geophysical results from the 1982 Tongan survey available in:

Scholl, David W., Vallier, Tracy L., 1985, Geology and Offshore Resources of Pacific Island Arcs-Tonga Region, Circum-Pacific Council for Energy and Mineral Resources Earth Science Series, Vol. 2: Circum-Pacific Council for Energy and Mineral Resources, Houston, Texas.